

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A method for extracting a face position, comprising the steps of:

preparing digital data of a value of each pixel within an object image region including a region of a human face; and

extracting in said object image region a position of a Between-the-Eyes candidate point ~~through a by scanning and filtering process with a Between-the-Eyes detecting filter in which six rectangles are connected[[:]], wherein~~

said Between-the-Eyes detecting filter has a width which is substantially as long as the width of the face,

said six rectangles are arranged in two in a horizontal direction x three in a vertical direction, and

when S_{ij} ($1 \leq i \leq 2$, $1 \leq j \leq 3$) represents an average value of brightness of pixels in each of said rectangles, said scanning and filtering process extracts pixels satisfying the following equations,

$S_{11} < S_{12}$ and $S_{11} < S_{21}$

$S_{13} < S_{12}$ and $S_{13} < S_{23}$; and

extracting a portion of said object image in a prescribed size which has the extracted position of said Between-the-Eyes candidate point at a center, and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

2. (Original) The method for extracting a face position according to claim 1, wherein said Between-the-Eyes detecting filter is one rectangle divided into six segments.

3. (Original) The method for extracting a face position according to claim 1, wherein said six rectangles includes

two first rectangles adjacent to each other in a vertical direction,

two second rectangles displaced relative to said first rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction, and
two third rectangles displaced relative to said second rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction.

4. (Original) The method for extracting a face position according to claim 1, wherein said step of selecting a true candidate point includes steps of
detecting positions of eyes through a pattern discriminating process with respect to said object image that corresponds to prescribed two rectangles among rectangles forming said Between-the-Eyes detecting filter,

correcting the position of said Between-the-Eyes candidate point to a middle point between two eyes based on said detected positions of the eyes,

rotating an input image around said corrected position of Between-the-Eyes candidate point such that the two eyes are aligned horizontally, and

extracting from said rotated input image a portion of said object image in a prescribed size which has the corrected position of said Between-the-Eyes candidate point at a center,

and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

5. (Original) The method for extracting a face position according to claim 1, wherein said step of preparing digital data includes a step of preparing said object image as a stereo image, and said step of selecting a true candidate point includes a step of selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a distance to said Between-the-Eyes candidate point from an observation point that is detected based on said stereo image.

6. (Currently Amended) A ~~program product~~ computer readable medium storing a program for causing a computer to execute a method for extracting a face position within an object image region, said program ~~product~~ causing said computer to execute the steps of: preparing digital data of a value of each pixel within an object image region including a region of a human face; and extracting in said object image region a position of a Between-the-Eyes candidate point ~~through a by scanning and~~ filtering process with a Between-the-Eyes detecting filter in which six rectangles are connected[[;]], wherein said Between-the-Eyes detecting filter has a width which is substantially as long as the width of the face, said six rectangles are arranged in two in a horizontal direction by three in a vertical direction, and

when S_{ij} ($1 \leq i \leq 2$, $1 \leq j \leq 3$) represents an average value of brightness of pixels in each of said rectangles, said scanning and filtering process extracts pixels satisfying the following equations,

$S_{11} < S_{12}$ and $S_{11} < S_{21}$

$S_{13} < S_{12}$ and $S_{13} < S_{23}$; and

extracting a portion of said object image in a prescribed size which has the extracted position of said Between-the-Eyes candidate point at a center, and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

7. (Currently Amended) The computer readable medium program product according to claim 6, wherein

said Between-the-Eyes detecting filter is one rectangle divided into six segments.

8. (Currently Amended) The computer readable medium program product according to claim 6, wherein

said six rectangles includes

two first rectangles adjacent to each other in a vertical direction,

two second rectangles displaced relative to said first rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction, and

two third rectangles displaced relative to said second rectangles by a prescribed amount in said vertical direction, and adjacent to each other in said vertical direction.

9. (Currently Amended) The computer readable medium program product according to claim 6, wherein

said step of selecting a true candidate point includes steps of
detecting positions of eyes through a pattern discriminating process with respect to
said object image that corresponds to prescribed two rectangles among rectangles forming
said Between-the-Eyes detecting filter,
correcting the position of said Between-the-Eyes candidate point to a middle point
between two eyes based on said detected positions of the eyes,
rotating an input image around said corrected position of Between-the-Eyes candidate
point such that the two eyes are aligned horizontally, and
extracting from said rotated input image a portion of said object image in a prescribed
size which has the corrected position of said Between-the-Eyes candidate point at a center,
and selecting a true candidate point from said Between-the-Eyes candidate points in
accordance with a pattern discriminating process.

10. (Currently Amended) The computer readable medium program product
according to claim 6, wherein

said step of preparing digital data includes a step of
preparing said object image as a stereo image, and
said step of selecting a true candidate point includes a step of
selecting a true candidate point from said Between-the-Eyes candidate points in
accordance with a distance to said Between-the-Eyes candidate point from an observation
point that is detected based on said stereo image.

11. (Currently Amended) An apparatus for extracting a face position, comprising:

an imaging unit preparing digital data of a value of each pixel within an object image region including a region of a human face; and

an extracting unit extracting in said object image region ~~a~~ position of a Between-the-Eyes candidate point ~~through a by scanning and~~ filtering process with a Between-the-Eyes detecting filter in which six rectangles are connected[[;]], wherein

said Between-the-Eyes detecting filter has a width which is substantially as long as the width of the face,

said six rectangles are arranged in two in a horizontal direction by three in a vertical direction and

when S_{ij} ($1 \leq i \leq 2$, $1 \leq j \leq 3$) represents an average value of brightness of pixels in each of said rectangles, said scanning and filtering process extracts pixels satisfying the following equations,

$S_{11} < S_{12}$ and $S_{11} < S_{21}$

$S_{13} < S_{12}$ and $S_{13} < S_{23}$; and

a selecting unit extracting a portion of said object image in a prescribed size which has the extracted position of said Between-the-Eyes candidate point at a center, and selecting a true candidate point from said Between-the-Eyes candidate points in accordance with a pattern discriminating process.

12. (Original) The apparatus for extracting a face position according to claim 11, wherein

said Between-the-Eyes detecting filter is one rectangle divided into six segments.

13. (Original) The apparatus for extracting a face position according to claim 11,
wherein

 said six rectangles includes
 two first rectangles adjacent to each other in a vertical direction,
 two second rectangles displaced relative to said first rectangles by a prescribed
 amount in said vertical direction, and adjacent to each other in said vertical direction, and
 two third rectangles displaced relative to said second rectangles by a prescribed
 amount in said vertical direction, and adjacent to each other in said vertical direction.

14. (Original) The apparatus for extracting a face position according to claim 11,
wherein

 said selecting unit includes
 an eye detecting unit detecting positions of eyes through a pattern discriminating
 process with respect to said object image that corresponds to prescribed two rectangles
 among rectangles forming said Between-the-Eyes detecting filter,
 a correcting unit correcting the position of said Between-the-Eyes candidate point to a
 middle point between two eyes based on said detected positions of the eyes,
 a rotating unit rotating an input image around said corrected position of Between-the-
 Eyes candidate point such that the two eyes are aligned horizontally, and
 a discriminant process unit extracting from said rotated input image a portion of said
 object image in a prescribed size which has the corrected position of said Between-the-Eyes
 candidate point at a center, and selecting a true candidate point from said Between-the-Eyes
 candidate points in accordance with a pattern discriminating process.

15. (Original) The apparatus for extracting a face position according to claim 11,
wherein
said imaging unit includes
a preparing unit preparing said object image as a stereo image, and
said selecting unit includes
a select processing unit selecting a true candidate point from said Between-the-Eyes
candidate points in accordance with a distance to said Between-the-Eyes candidate point from
an observation point that is detected based on said stereo image.